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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,121	08/28/2003	Olvi L. Mangasarian	1061-001US01	5513

28863 7590 08/03/2007  
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EXAMINER
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TRAN, MAI T

ART UNIT	PAPER NUMBER
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2129

MAIL DATE	DELIVERY MODE
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08/03/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/650,121	Applicant(s) MANGASARIAN ET AL.	
	Examiner Mai T. Tran	Art Unit 2129	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 March 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>03/05/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

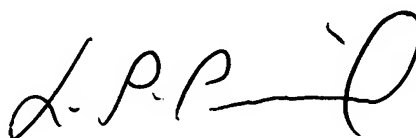
In view of the appeal brief filed on March 20, 2007, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:



Leo Picard  
Supervisory Patent Examiner

LEO PICARD  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100

### SPECIFICATION

The disclosure is objected to because of the following informalities:

- On page 4, paragraph [0018], line 4, line 14, and line 21 respectively: reference character 22 have all been used to designate “the reduced set of input features or

reduced kernel functions”, “the reduced set of input features or kernel functions”, and “input features”. Applicants need to be consistent.

Appropriate correction is required.

### **RESPONSE TO ARGUMENTS**

#### **Rejection of claims 1-47, 49-50, 52-53, and 55-57 under 35 U.S.C. § 101**

Applicant’s arguments, see page 12, lines 1-2, filed March 20, 2007, with respect to claims 1-47, 49-50, 52-53, and 55-57 have been fully considered and are persuasive. The rejection of claims 1-47, 49-50, 52-53, and 55-57 under 35 U.S.C. §101 has been withdrawn.

### **CLAIM REJECTIONS - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-5 and 7-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over “A Newton Method for Linear Programming”, by O. L. Mangasarian, Data Mining Institute Technical Report 02-02, March 2002, hereinafter Mangasarian, and further in view of “Data Selection for Support Vector Machine Classifiers”, by Glenn Fung et al, Data Mining Institute Technical Report 00-02, February 2000, hereinafter Fung.

**Claim 1**

Mangasarian teaches a method comprising:

defining a linear programming formulation of a support vector machine classifier (page 13, lines 1-3, page 3, paragraph 2);

solving an exterior penalty function of a dual of the linear programming formulation to produce a solution to the support vector machine classifier (page 3, paragraph 2, page 4, lines 1-8); and

Mangasarian fails to teach select an input set for the support vector machine classifier.

Fung discloses Data Selection for Support Vector Machine classifiers (title).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine the method of Mangasarian with the data selection of Fung.

The motivation for doing so would be to have a classifier with improved testing set accuracy over a standard support vector machine (Fung, page 64, right col., lines 1-2).

**Claim 2**

Mangasarian teaches the method of claim 1, further comprising minimizing the exterior penalty function for a finite value of a penalty parameter (page 3, paragraph 2).

**Claim 3**

Mangasarian teaches the method of claim 1, wherein the linear programming formulation is a 1-norm linear programming formulation (page 2, last paragraph).

**Claim 4**

Mangasarian teaches the method of claim 1, wherein the solution is a least 2-norm solution (page 3, paragraph 2).

**Claim 5**

Mangasarian teaches the method of claim 1, wherein the support vector machine classifier is a linear support vector machine classifier (page 13, lines 4-6), and selecting an input set includes selecting a set of input features of the linear support vector machine classifier (Fung, page 64, abstract, lines 11-12).

**Claim 7**

Mangasarian teaches the method of claim 1, further comprising:

calculating a separating surface based on the selected input set and the support vector machine classifier (page 13, lines 1-18); and  
classifying data using the separating surface (page 13, lines 1-18).

**Claim 8**

Mangasarian teaches the method of claim 7, further comprising classifying the data into two sets of data using the separating surface (page 13, lines 1-18).

**Claim 9**

Mangasarian teaches the method of claim 7, wherein the separating surface is one of an n-dimensional hyperplane or a nonlinear surface (page 13, lines 1-18. Examiner asserts the separating surface is a hyperplane).

**Claim 10**

Mangasarian teaches the method of claim 1, further comprising applying a Newton-based algorithm to solve the exterior penalty function (title, page 6, paragraph 3).

**Claim 11**

Mangasarian teaches the method of claim 1, further comprising applying one or more linear constraints to the solution of the exterior penalty function (page 2, lines 19-21).

**Claim 12**

Mangasarian teaches the method of claim 1, wherein selecting an input set includes selecting a subset of input features from a larger set of input features that is substantially larger than the subset of input features (Fung, page 64, abstract).

**Claim 13**

Mangasarian teaches the method of claim 12, wherein the subset of input features includes less than approximately one percent of the larger set of input features (page 15).

**Claim 14**

Mangasarian teaches the method of claim 12, wherein the subset of input features includes less than approximately 0.1 percent of the larger set of input features (page 15).

**Claim 15**

Mangasarian teaches the method of claim 12, wherein the larger set of input features includes more than 20,000 input features, and the subset of input features includes less than ten input features (Fung, page 69).

Claims **6 and 46-48** are rejected under 35 U.S.C. 103(a) as being unpatentable over “A Newton Method for Linear Programming”, by O. L. Mangasarian, Data Mining Institute Technical Report 02-02, March 2002, hereinafter Mangasarian, in view of “Data Selection for Support Vector Machine Classifiers”, by Glenn Fung et al, Data Mining Institute Technical Report 00-02, February 2000, hereinafter Fung, and further in view of “Finite Newton Method for Lagrangian Support Vector Machine Classification”, by Glen Fung et al, Data Mining Institute Technical Report 02-01, February 2002, hereinafter Fung2.

Mangasarian in view of Fung teaches the method of claim 1 with the exception of a nonlinear support vector machine classifier.

Fung2 teaches Linear and Nonlinear kernel classification (page 3, paragraph 2).



It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine the method of Mangasarian in view of Fung with the linear and nonlinear kernel classification of Fung2.

The motivation for doing so would be a nonlinear classifier performs better than a linear classifier (Fung2, page 16, paragraph 5.2.2, line 3).

**Claim 6**

The method of claim 1, wherein the support vector machine classifier is a nonlinear support vector machine classifier (Fung2, page 5, line 16), and selecting an input set includes selecting a set of kernel functions for the nonlinear support vector machine classifier (Fung, title).

**Claim 46**

The method of claim 1, further comprising applying the support vector machine classifier to classify data relating to one of fraud detection, credit evaluation, gene expression, intrusion detection, medical diagnosis or medical prognosis (Fung2, page 13, paragraph 5.1, 5.1.1).

**Claim 47**

The method of claim 1, further comprising applying the support vector machine classifier to classify data relating to multiple myeloma (Fung2, page 13, paragraph 5.1).

**Claim 48**

The method of claim 1, further comprising applying the support vector machine classifier to classify data relating to absolute call measurements for multiple myeloma (Fung2, page 13, paragraph 5.1.1).

**Claims 16-20, 22-30 and 55-56**

This is a system version of the claimed method discussed above, in claims 1-5 and 7-15, wherein all claimed limitations have also been addressed and/or cited as set forth above.

**Claims 21, 49-51 and 57**

This is a system version of the claimed method discussed above, in claims 6 and 46-48, wherein all claimed limitations have also been addressed and/or cited as set forth above.

**Claims 31-35 and 37-45**

This is a software version of the claimed method discussed above, in claims 1-5 and 7-15, wherein all claimed limitations have also been addressed and/or cited as set forth above.

**Claims 36 and 52-54**

This is a software version of the claimed method discussed above, in claims 6 and 46-48, wherein all claimed limitations have also been addressed and/or cited as set forth above.

**RESPONSE TO ARGUMENTS**

**Rejection of claims 1-57 under 35 U.S.C. § 102(b):**

Applicants' arguments with respect to claims 1-57 have been considered but are moot in view of the new ground(s) of rejection.

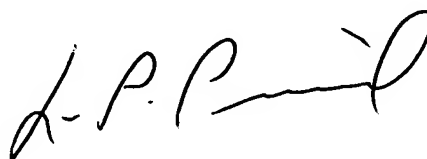
### CORRESPONDENCE INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mai T. Tran whose telephone number is (571) 272-4238. The examiner can normally be reached on 10:00 am - 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Vincent can be reached on (571) 272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

M.T.T  
Patent Examiner



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TECHNOLOGY CENTER 2100